Buildings for the 21st Century

Spring 2002 | News You Can Use

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Brochure Series Highlights High-Performance Buildings

An eye-catching series of brochures, "Highlighting High Performance," is spreading the word about the benefits of high-performance commercial buildings. Showcasing buildings that vary in location, size and use, the brochures outline features that make each building more energy efficient and environmentally friendly than a typical building.

Including colorful illustrations and photographs, the award-winning brochures illustrate the advantage of whole-building design—a process that considers all building components during the design phase, integrating them so they work together.

Whole-building design considers the building structure and systems as a whole and examines how they best work together to save energy and reduce environmental impact. For example, a building with extensive daylighting will reduce the amount of heat emitted by lighting fixtures, thus allowing for a smaller air conditioning system. This whole-building philosophy considers site, energy, materials, indoor air quality, acoustics, natural resources and their interrelation.

"With the Highlighting High Performance series, we hope to get developers, building owners and the public to rethink the way we approach commercial buildings," says Lani MacRae, leader of communications for BTS. "The brochures are a great set of case studies that show the variety of forms a high-performance building can take. They also make clear some of the relationships between the components of a building that help us understand what is meant by 'whole-building design' and how design elements can affect a building's performance."

The buildings highlighted in the series range dramatically in location and building type—from the Zion National Park Visitor Center in Utah to the 4 Times Square skyscraper in New York City—demonstrating that high-performance buildings can take many forms.

Eight brochures are available, with more on the way; in addition to Zion Visitor Center and 4 Times Square, brochures feature the BigHorn Home Improvement Center in Silverthorne, Colorado; the Chesapeake Bay Foundation headquarters in Annapolis, Maryland; the Pennsylvania Department of Environmental Protection's Cambria Office Building; and the National Renewable Energy Laboratory's Thermal Test Facility, Solar Energy Research Facility, and Visitors Center, all in Golden, Colorado. Upcoming brochures include a look at San Francisco's Thoreau Center for Sustainability, a historic building that was rehabilitated to embrace sustainable design while preserving its historical integrity.

The brochures have won three awards, including a National Association of Government Communicators 2001 Blue Pencil Award.

The four-page brochures are available online at *www.eren.doe.gov/buildings/documents/* in pdf format. Some brochures are available in hardcopy through the Energy Efficiency and Renewable Energy Clearinghouse at 1-800-363-3732.

For more information about high-performance buildings and whole-building design, see *www.highperformancebuildings.gov.*

Our Last Issue

This is the last issue of Buildings for the 21st Century. *During the next few months, DOE's Office of Energy Efficiency and Renewable Energy will be reorganizing to better accomplish its mission by streamlining and integrating program and business management.*

Since this newsletter's inception in 1999, we have endeavored to provide our stakeholders with the latest news on energy efficient building research and development, and deployment programs such as ENERGY STAR®, Building America, Weatherization Assistance, the State Energy Program, Codes and Standards, and Rebuild America.

As we tackle the tough national energy challenges ahead, the Office of Energy Efficiency and Renewable Energy will continue these vital partnerships, other deployment activities and its R&D programs, for the benefit of citizens and businesses in communities throughout the nation. Through a similar newsletter, printed and/or electronic, we hope to continue addressing energy efficient building programs and environmental issues of concern to industry, schools, homeowners, government agencies, industry groups, non-government organizations and the general public. It has been a pleasure to serve you and we look forward to communicating with you in the future.

Genesis Homes Showcases Innovative, High-Performance Home

Builders and developers learned about Genesis Homes' newest and most innovative home during the 2002 International Builders' Show. Called the "Bainbridge," the home was the only home in the show that was constructed, finished and completely decorated in less than six days. This new modular home exemplifies off-site construction techniques that can offer savings to homebuyers and increased profits for builders.

Genesis Homes — NREL/PIX10801

Energy efficient features in the Bainbridge modular and manufactured home qualify it for the ENERGY STAR® program.

The Bainbridge home is a 2,595-square-foot model that features a flexible floor plan, a high-tech home theater, a personal fitness center and fully integrated home systems—allowing control of HVAC, alarm and other systems from any Internet-enabled computer—capable of expanding with rapid changes in technology. It also features 9-foot ceilings, except in the great room, where a 15-foot ceiling includes multiple crossbeams. Most important, it qualifies for the ENERGY STAR® program by being energy efficient and reducing environmental impact.

Genesis worked with the Building America Industrialized Housing Partnership (BAIHP) to achieve high-performance energy efficiency on the Bainbridge model. ENERGY STAR® homes incorporate technologies and building practices that require 30 percent less energy for heating, cooling and water heating than homes built to the Model Energy Code (MEC), the national energy efficiency code. (States must adopt provisions that meet or exceed the MEC.)

BAIHP sent researchers to Genesis factories to evaluate the home's ENERGY STAR® potential and suggest ways of improving performance, specifically in the duct systems. Taking the next step, Genesis is training its own staff to build and rate all of its homes to ENERGY STAR® levels. According to Genesis, the Bainbridge model is "smart, clean, energy efficient and green."

Genesis Homes, the country's only nationwide builder of modular homes, is a member of Champion Enterprises. Genesis operates 11 off-site construction facilities. For more information on Genesis Homes, see *www.genesishomes.com.*

For more information on the Building America Program, see *www.building_america.gov.*

Database Lists High-Performance Design

A new database of high-performance design case studies could become a valuable tool in buildings research. Highlighting innovative work in such fields as energy efficiency, materials use and water conservation, the database is expected to become a clearinghouse for information on sustainable building design.

Developed by BuildingGreen in collaboration with the National Renewable Energy Laboratory, the database is set up to allow anyone to register and submit a project. The database currently includes approximately 50 case studies and is searchable by project name, owner, location and building type and size.

For many buildings, the content is comprehensive, including sections on financing, land use, ratings, materials, lessons learned and awards. Images are included for many projects. But while the database includes a dozen potential sections, a building doesn't need to be green in all areas to be included as a case study. Only information pertinent to green design will be displayed for each project.

To enter a project, visit the database (URL listed below) and register. You will have access to your project to enter information and edit as often as you wish before submitting it for review. When submitted, entries will be reviewed for completeness and consistency of data.

Look for demonstrations of the database at upcoming building conferences, including the American Institute of Architects 2002 National Convention and Expo in May.

Visit the database at *www.nrel.gov/buildings/highperformance/case_studies/QueryForm/index.cfm.*

State Energy Program Makes the Connection

Over the past 25 years, states have become centers of innovation for energy issues. Supported by congressionally authorized formula grants administered by DOE's State Energy Program (SEP), the state energy office network has become a rallying point for demonstrating new energy efficiency and renewable energy technologies, creating energy programs tailored to local needs and providing a voice for states in setting national energy priorities.

Reputation for Creativity

In its early years, Congress directed funding to very specific programs in the states. For example, the Institutional Conservation Program (ICP)—a predecessor program for SEP—enabled states to increase the energy efficiencies of hospitals and schools through technical analysis and installing energy conservation measures. But ICP funding could not be used for other types of projects. When ICP and other programs were merged into SEP in 1996, DOE granted the states more authority to set their own priorities.

More important, the states have become a key part of DOE's effort to further the adoption of energy efficiency and renewable energy technologies. The mechanism to carry out this strategy is SEP Special Projects. Unlike formula grants, states compete for Special Projects funding, totaling $18.5 million in Fiscal Year 2002. States may partner with private groups and contribute their own resources to these projects, usually about 50 percent of the total. For its formula grants, the State Energy Program leverages $4 in state and private funding for every $1 of DOE investment, which is among the highest leveraging for any DOE program.

Promoting Best Practices

The network of state energy offices has also been instrumental in helping innovative programs from single states gain wider acceptance and encouraging the American public to adopt energy efficiency. Many of these practices are so well established that their success has eclipsed the role of SEP in helping them get started. Take, for example, the following required improvements under SEP:

- Right turn on a red light, and left turn on red on one-way streets
- Car pooling, van pooling and high occupancy traffic lanes
- Improving energy building codes in local jurisdictions

Jeff Bates – NREL/PIX10666

Karen H. Groff, principal of Bluffsview Elementary School, calculates the energy output from its rooftop PV array. This innovative solar energy system and educational tool was made possible through a partnership of the Ohio Energy Office, DOE, American Electric Power, BP Solar, the Foundation for Environmental Education, and the Ohio Environmental Protection Agency.

Furthermore, many of DOE's highly successful energy programs began as pilot or demonstration projects in a state energy office. Here are a few examples:

- Motor Challenge, which increases the efficiency of electric motors in industry, began as a pilot project by the state of Washington.
- Home Energy Ratings, a pilot project by the state of Arkansas, evaluates the energy efficiency of existing homes.
- Many programs offering energy loans to industry and commercial businesses, schools, state and local governments started in a state energy office; see, for example, the New York Energy $mart Loan Fund, Texas' LoanSTAR Revolving Loan Program and Nebraska's Dollar and Energy Saving Loan Program.
- In the early 1990s, the state of California introduced energy loans to homeowners to buy down the initial cost of renewable energy systems.
- Since its inception in 1980, the National Energy Education Development (NEED) organization has grown from sponsoring a one-day celebration of energy awareness to a national entity that operates with state SEP funding in 37 states, introducing energy education into school curricula.

Through SEP, good ideas developed at a local and state level can percolate through the network and accelerate energy programs throughout the country.

Visit the State Energy Program Web site at *www.eren.doe.gov/buildings/state_energy/.*

Solid-State Ceramic Lighting Reduces Pollution, Energy Use

Solid-state ceramic lighting is now available with a new technology that can illuminate commercial signs with 90 percent less energy than conventional technologies.

This new, patented technology—electroceramescent lighting—illuminates only the letters or information on a sign's surface, unlike hollow "box" signs that illuminate the entire surface. Electroceramescent technology reduces light levels even more through glare resistance, which minimizes reflected light, and by matching the sign's spectra to human eye sensitivities.

Currently, the United States consumes about 17 billion kilowatt-hours (kWh) of energy every year to illuminate commercial signs, about 5 billion kWh of which operate "box" signs. Fluorescent and incandescent bulbs provide most of this illumination. Electroceramescent technology could considerably reduce "box" sign energy consumption, saving about 2 billion kWh and $140 million annually. Environmental benefits include reducing outdoor light pollution and the amount of carbon dioxide released into the atmosphere by billions of tons.

Besides its considerable energy efficiency and environmental benefits, an electroceramescent sign has many other advantages:

- The low power requirement makes it ideal for remote locations where grid-supplied power is unavailable.
- Because it's made of ceramic layers on a steel substrate, it's very durable and vandalism-resistant, allowing it to be used outdoors in a variety of settings.
- It may last up to 10 years, eliminating replacement and maintenance requirements of an incandescent or fluorescent sign.
- Because it's glare-resistant, it's safer for highway use than conventional technologies.

Meadow River Enterprises–NREL/PIX11032

The new electroceramescent lighting technology is displayed on a sign for the National Energy Technology Laboratory.

The solid-state ceramic light using electroceramescent lamp technology was developed by Meadow River Enterprises, along with DOE's Lighting Research and Development Program, the New York State College of Ceramics at Alfred University and Marshall University.

Weatherization — A National Energy Priority

There is newfound zip in the weatherization network. Consisting of about 1,000 state, local and nonprofit agencies that serve every county in the United States, this network provides weatherization services to more than 100,000 lower income families every year. This year, weatherization has become a national energy priority with a high-profile role in the National Energy Policy. Today there is growing acknowledgement of the benefits of permanently reducing energy bills of low-income families through weatherization.

Technical Competence

This recognition comes from 25 years of steadily increasing technical competency and effectiveness of weatherization crews. They're trying new techniques, documenting the savings and evaluating their cost-effectiveness.

Weatherization Assistance Program Technical Assistance Center

A low-income home in Washington, DC, is insulated.

In fact, many efficiency techniques developed for weatherizing low-income housing are being adopted by the larger residential energy efficiency industry. The blower door is one of the best examples of this technology transfer. Weatherization crews were among the first groups to adopt blower doors for analyzing leaks—paths for air infiltration into and out of homes—on a widespread basis. This technique was so successful for quickly analyzing energy use in low-income housing that it has now become standard for the home energy rating industry for all types of housing.

Weatherization Assistance Program Technical Assistance Center

An energy audit is performed on a home in Maryland. Weatherization permanently reduces the energy bills of low-income families, which allows them to focus on other, more important matters.

Gearing Up

On the other hand, increased recognition does not come without a challenge. As DOE Assistant Secretary David Garman told the National Weatherization Conference in Atlanta late last year, "Increased funding brings higher expectations." DOE funding for weatherization is $77 million more in Fiscal Year 2002 than in 2001, an increase of 50 percent. "You'll be expected to provide services this year to 30,000 more homes than last year," he said. DOE is helping by expediting funding to the states so they can ramp up work as quickly as possible.

As Garman explained, weatherization crews are taking advantage of new flexibility in rules to increase their efficacy. These include "electric base load measures" to improve the efficiency of electrical appliances such as refrigerators and water heaters. Similarly, DOE has broadened allowable measures in recent years to include cooling, which is especially helpful in addressing the needs of low-income families in the South and Southwest.

By making weatherization a national priority, DOE is helping people with immediate needs. More than 27 million households are currently eligible for assistance, among which approximately 10 to 15 million homes are good candidates for weatherization. For low-income families, the percentage of income spent on energy bills is four times that for more affluent families. Some senior citizens on fixed incomes, for example, spend 35 percent or more of their income on energy. For these people, weatherization increases their financial independence. And through the ripple effect, weatherization brings multiple economic benefits to low-income communities across the country. As more than 5 million satisfied customers can attest, weatherization works!

Simplified Web Site Addresses

Some of the BTS Web site addresses (URLs) have been simplified to make them easier to remember. Listed below are new addresses that have been activated. Old addresses will continue to work.

www.buildingamerica.gov
www.buildings.gov
www.commercialbuilding.gov
www.energycodes.gov
www.energypartners.gov
www.energyplus.gov
www.energysavers.gov
www.energyschools.gov
www.energysmartschools.gov
www.energytools.gov
www.energytoolsdirectory.gov
www.highperformancebuildings.gov

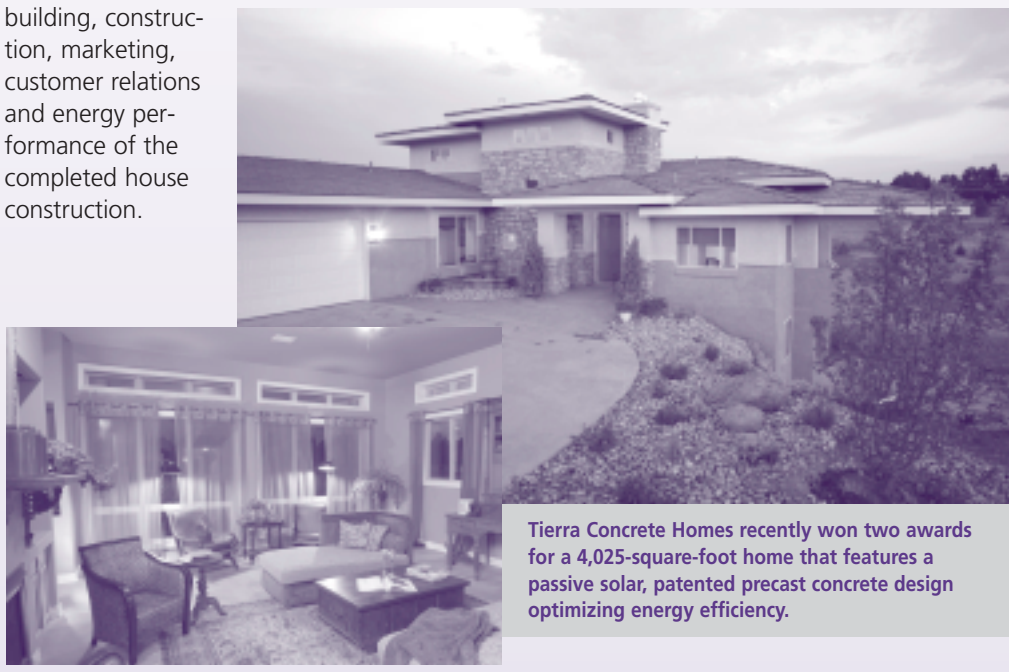
Meetings, Events & Conferences Calendar

Date	Meeting, Event, Conference	Contact
May 9–11	2002 AIA National Convention and Expo Charlotte, NC	www.aia.org
May 15–17	NAESCO Mid-Year Conference Chicago, IL	www.naesco.org
June 2–5	Energy 2002 Palm Springs, CA	www.energy2002.ee.doe.gov
June 15–20	Solar 2002 Reno, NV	www.solarenergyforum.org
June 24–27	National Low-Income Energy Conference Fort Lauderdale, FL	www.nliec.org
June 25–28	PCBC 2002: Home Buildings Premier Trade Show and Conference San Francisco, CA	www.pcbc.com
June 30–July 5	Indoor Air 2002 Monterey, CA	www.indoorair2002.org
July 15–18	National Workshop on State Building Energy Codes Des Moines, IA	www.energycodes.gov

Colorado Builder Wins EnergyValue Housing Awards

Tierra Concrete Homes of Pueblo, Colorado, was awarded two EnergyValue Housing Awards (EVHA) by the National Association of Home Builders (NAHB) Research Center at the 2002 International Builders' Show in Atlanta. Winning both a Gold Award and Builder of the Year Award, Tierra Concrete Homes demonstrates that it is a leader in energy and resource-efficient construction.

The EnergyValue Housing Award honors builders who voluntarily integrate energy and resource efficiency into the design, construction and marketing of their new homes. The program educates the home-building community and the public about successful approaches to resource-efficient construction. Entries are judged by an expert panel on the basis of nine criteria: practicality, land use and site planning, design, innovation, resource-efficient building, construction, marketing, customer relations and energy performance of the completed house construction.



Tierra Concrete Homes recently won two awards for a 4,025-square-foot home that features a passive solar, patented precast concrete design optimizing energy efficiency.

Tierra Concrete Homes — Left, NREL/PIX11021; right, PIX11022

The Tierra Concrete Homes' award-winning 4,025-square-foot home features a passive solar, patented precast concrete design that optimizes energy efficiency. Large, south-facing windows have a high-solar heat-gain coefficient. Overhangs protect the southern exposure from unwanted solar heat gain. North, west and east windows are minimized, and where used windows have a low-solar, heat-gain coefficient. Solar panels preheat water for domestic use and in-floor radiant heating. An energy-recovery ventilator introduces fresh air into the home while recovering heat from the outgoing air.

Tierra Concrete Homes worked with DOE's Building America Program and National Renewable Energy Laboratory to develop its award-winning designs. Extensive testing and monitoring included the use of infrared cameras to find points where energy was escaping the test homes.

Judy Fosdick, president of Tierra Concrete Homes, designs her homes with a focus on the environment. "We use as many environmentally friendly concepts as we can," Fosdick says. Among these is the use of recycled products, recycling scrap building materials and water conservation features.

Tierra Concrete Homes was designated as the first certified Green Builder in southern Colorado by the Built Green Colorado Program. Its combination of passive solar design and insulated concrete construction has won many other sustainability awards over the years.

More information about the EnergyValue Housing Award can be found on the NAHB Research Center Web site at *www.nahbrc.org.*

For more information on Tierra Concrete Homes, see *www.tierraconcretehomes.com.*

For more information on the Building America Program, see *www.building_america.gov.*

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